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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,762	09/19/2005	Shinji Kawasaki	28953.7283	8406

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STEPTOE & JOHNSON LLP  
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WASHINGTON, DC 20036

EXAMINER
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ROBINSON, LAUREN E

ART UNIT	PAPER NUMBER
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1709

MAIL DATE	DELIVERY MODE
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10/01/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/549,762

Applicant(s)

KAWASAKI ET AL.

Examiner

Lauren E.T. Robinson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 12-31 is/are pending in the application.
- 4a) Of the above claim(s) 22-31 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 12-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                                                                            |                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>19 September 2005</u> . | 6) <input type="checkbox"/> Other: _____                                                |

**DETAILED ACTION**

***Election/Restrictions***

1. In response to the applicants' election filed on 4 September 2007 wherein the article of Group 1, claims 12-21 was elected with traverse. Since the applicants' reply to the restriction requirement does not distinctly and specifically pointing out supposed errors in requirement, the election shall be treated as an election without traverse.

***Claim Rejections - 35 USC § 102***

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 12, 14, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by McArdie et al. (US Publication No. 20020066233).

McArdie et al. teach ceramic aggregate particles comprising a plurality of solid particulates such as silicon carbide (Pg. 2, Col. 2, Par. 0028) bound together by silicon nitride (Pg. 2, Col. 1, Par. 0022) or a ceramic binder precursor material made of glass powder in the form of  $\text{Al}_2\text{O}_3$  (Pg. 5, Col. 2, Par. 0058). The reference discloses that the binding material improves porosity in between the particles (Pg. 3, Col. 2, Par. 0035) and therefore must be present between the particles. McArdie et al. also teach that the binding material can be made by heating at a temperature in between 900 to 1400°C (Pg. 5, Col. 2, Par. 3), have a pore diameter ranging from 0.07 to about 900 micrometers (Pg. 20, Col. 1, Par. 1) and a porosity of 40% (Pg. 10, Col. 1, Par. 0102). Furthermore, reference teaches that the silicon carbide can have a surface coating to improve adhesion (Pg. 3, Col. 1, Par. 0032).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 13, 15, and 17-21 are rejected under 35 U.S.C. 103(a) as being obvious over McArdie et al. (US Publication No. 20020066233) in view of Ohno et al. (WO 2002026351).

As discussed above, McArdie et al. teach ceramic aggregate particles comprising a plurality of solid particulates such as silicon carbide (Pg. 2, Col. 2, Par. 0028) bound together by silicon nitride (Pg. 2, Col. 1, Par. 0022) or  $\text{Al}_2\text{O}_3$ . However, McArdie et al. are silent with regard to the specific surface area of the said pores, the heat resistant temperature, and gas permeability of the material.

Ohno et al. teach a catalyst holding filter made of a ceramic support of silicon carbide covered with a catalyst layer. The average pore size is between 10 to 250 micrometers and the porosity % is between 40 to 80% (abstract). The said ceramic support can be made of silicon nitride or silicon carbide and are treated at high temperatures (Pg. 6, Col. 1, Par. 0094) to increase the heat resistance (Pg. 2, Col. 1, Par. 0024). When below 800°C an oxidation reaction does not happen but above 1600°C it happens too rapidly, therefore it is the reference's preference to heat between 100-1500°C (Pg. 9, Col. 1, Par. 0130). By using this temperature, Ohno et al. are able

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to resist deterioration effect of the elevated temperature (heat resistance). The reference also teaches covering the silicon carbide particle with a layer (Pg. 3, Col. 1, Par. 0053) such as  $\text{Al}_2\text{O}_3$  (Pg. 7, Col. 2, Par. 0114) and the pores that form -between particles catch fine particles (Pg. 3, Col. 2, Par. 0061) such as soot. The said pores have a specific surface area of  $0.12 \text{ m}^2/\text{g}$  (Pg. 5, Col. 2, Par. 0085). When the said pores in this reference are too small (10 micrometers), pressure loss is increased but when the said pores are too large (250 micrometers), the soot clogs the gas passing pores (Pg. 1, Col. 2, Par. 0018). Therefore, the said pores in this reference have a gas permeability that is either large when the diameter is small or small with the diameter is large.

**In reference to claims 13, 15, and 17:** Both references use  $\text{Al}_2\text{O}_3$  around the silicon carbide particles to form the said pores between the silicon carbide and binder. Although McArdie et al. are silent with regard to the specific surface area of the said pores, since the specific surface area of the pores is less than  $1 \text{ m}^2/\text{g}$  in Ohno et al., it would have been obvious to one with ordinary skill in the art at the time the invention was made to modify McArdie et al. to include a specific surface area less than  $1 \text{ m}^2/\text{g}$ , corresponding to applicants' claim 13. Also, since both teachings include that the porosities are of 40% or more and the pore diameter is within the applicants' range, by modifying McArdie's reference to include a pore specific surface area of  $1 \text{ m}^2/\text{g}$  or less would correspond to the applicants' claims 15 and 17.

**In reference to claims 18 and 19:** Both references, as discussed above including the pore specific surface area determined to be obvious, teach silicon carbide

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particles bound together by a binder such as silicon nitride or  $\text{Al}_2\text{O}_3$  with pores formed between and while McArdie et al. teach that the product can be heated in between 900 to 1400°C, they are silent with regard to this temperature range being heat resistant. The examiner notes that heat resistant is defined as the ability to resist deterioration effects of elevated temperatures. Since Ohno et al. teach that deterioration occurs at the elevated temperature of 1600°C or higher and therefore the temperature range 100-1500°C is preferable, then temperatures lower than 1600°C and in the range taught by Ohno et al. would be heat resistant temperature. Therefore, since McArdie et al. teach that the product can be heated in between 900 to 1400°C and this temperature range is within the heat resistant range of Ohno et al., then it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify McArdie et al. to include that the temperature range ( including 1200 °C or higher) was heat resistance.

**In reference to claims 20 and 21:** Both references, as discussed above including the pore specific surface area and the heat resistance determined to be obvious, teach silicon carbide particles bound together by a binder with pores formed between. While McArdie et al. is silent with regard to gas permeability, Ohno et al. teach that silicon carbide and silicon nitride increase gas permeability and the pores such as the ones formed in McArdie et al. collect particles of soot.

Ohno et al. disclose that if the pore diameter is at 10 micrometers (which is taught by both references) then too much gas will flow through the pores and if the pores are at 250 micrometers (which is taught by both references) then not much gas

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flow can occur. Due to this permeability of gas occurring at either a small amount, where almost no permeability occurs, or a large amount in this reference, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Ohno et al. to include that the permeability could be as small as  $1 \text{ um}^2$  or larger due to pore diameter factors. Therefore, since Ohno et al. teach that the gas permeability can be extremely small with almost no permeability to very large with increasing permeability and it was determined obvious to modify Ohno et al.'s teaching to include the possibility that the gas permeability could occur at  $1 \text{ um}^2$  or larger, then it would have been further obvious to modify McArdie et al.' teaching to include that the pores had a gas permeability of  $1 \text{ um}^2$  or larger depending on pore diameter,

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lauren E.T. Robinson whose telephone number is (571) 270-3474. The examiner can normally be reached on Mon. through Fri. 7:30 to 5:00 EST (First Fri Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571) 272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Lauren E.T. Robinson  
Examiner  
Art Unit 1709

D. LAWRENCE TARAZANO  
PRIMARY EXAMINER  
